Current perspectives of doping in football and the 2010 list of prohibited substances

In sport, the use of pharmacological agents or other biological or non-biological methods to artificially enhance performance (cheating) is commonly referred to by the term 'doping'.

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While some argue that the use of performance-enhancing substances is little different from the use of new advantageous materials in the construction of sports apparel, swim suits and other sporting equipment, which similarly aid performance and can give competitors advantage over others, the reasons for the ban are in the interest of both fair play and, most importantly, the physical and mental health of the athlete, as this may be severely compromised by the use of banned substances. The practice of doping is therefore considered unethical by most international sports federations, the International Olympic Committee (IOC) and the World Anti-Doping Agency (WADA), and sanctions are applied to athletes who transgress the rules as set out by WADA and adopted by the sports federations that are signatories to the World Anti-Doping Code. With the upcoming 2010 FIFA World Cup South Africa taking place this year, it would be prudent to focus on the status of doping and anti-doping efforts in the sport of football, with particular emphasis on practical considerations for medical personnel who might be treating or managing competitive football players.

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Historical perspective

Following the amphetamine and nicotinyl tartrate-related deaths of athletes participating in the Rome Olympic Games of 1960 and Tour de France in 1967, the fight against doping was initiated in earnest in 1968 at the Olympic Games in Mexico City. Although regular testing of athletes has occurred since this time, both the testing and sanctions have failed to prevent athletes from doping. Indeed, doping has become easier, since instructions on how to dope and access to substances are readily available through a variety of Internet sites. Indeed, many of the methods used by athletes today (synthetic and undetectable molecules, gene doping, etc.) require advanced technological and medical 'support' and therefore the anti-doping efforts have constantly needed to be refined, upgraded and advanced.

FIFA, through their Medical Committee and F-MARC (FIFA-Medical Assessment and Research Centre) programme, initiated a system of doping control in 1970 and is responsible for the implementation of doping control at all FIFA competitions. Furthemore, they have developed a network of medical doping control officers who are responsible for execution of doping control testing and education of athletes and medical staff within the Confederations and National Associations.[1]

Current situation

Doping control tests are conducted both in and out of competition. However, due to the length of the season, an elite level footballer is hardly ever out of competition. During major competitions (including the upcoming World Cup) urine samples are collected from two randomly selected players from each team after each match. In addition, each team is subject to random, unannounced testing during preparations for the upcoming tournament. The doping control officials may also request blood testing for certain analyses, including erythropoietin and other substances. When elite level players are not in competition, the doping control agencies have to receive whereabout forms detailing the geographical location of the athlete at all times.

Once the urine has been collected (under strict observation and procedure) from the player, and the player and team doctor declare all medications, the urine specimen is divided into an A and B sample and is then sealed in individual tamper-proof containers. These containers are then transported under strict chain of custody rules to the accredited doping control laboratory, where the detailed analysis for the prohibited substances takes place. In southern Africa, the laboratory in Bloemfontein is the WADA/IOC accredited laboratory and testing of samples will be conducted at this venue during the 2010 FIFA World Cup. Should the laboratory report an adverse analytical finding on the A sample, the player may accept his/her right to be present at the analysis of the B sample. If there is an adverse analytical finding, this is communicated to the federation who will then take the matter further with the player and usually a hearing takes place. If the athlete is deemed to have doped, a sanction is given, which can vary from a number of months to a life ban, depending on the offence.

In a recent analysis, it was estimated that football has well over 200 000 elite players throughout the world and in excess of 20 000 doping control tests are conducted annually on these players. According to this analysis, the incidence of doping in football is quite low (0.4%) and the vast majority of adverse analytical findings are due to recreational drugs including cannabis and cocaine with only 0.07% of positive cases due to abuse of anabolic steroids.[2] At the 2006 FIFA World Cup there was not a single positive test. In fact, in the period between 1994 and 2005 at major FIFA competitions, only 4 urine samples tested positive: 2 for ephedrine/pseudoephedrine, 1 for cannabis and 1 for nandrolone.[3]

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2010 prohibited list of substances

The 2010 prohibited list of substances for both in and out of competition is outlined in Table I and Table II. A complete list can be downloaded at www.wada-ama.org

2010 therapeutic use exemption

It must be appreciated that players may suffer from the same medical disorders as the non-athletic population and therefore should be afforded the most appropriate medical care for the condition or ailment. This management might include the use of agents that appear on the abovementioned list. The process of application for therapeutic use exemption (TUE) exists to address this requirement.[4] The TUE should be applied for by the treating physician and player together, all the relevant clinical information should be supplied, and the application should be completed at least 30 days before the event. In assessing the application, a TUE committee would evaluate the following to grant a TUE: if the player would suffer detrimental health without use of the said agent; if the said agent would provide any additional performance enhancement over and above that which might be experienced by a return to normal health following treatment of a medical condition;

Table I. World Anti-Doping Code: The 2010 Prohibited List – Substances and methods prohibited at all times (in and out of competition)

PROHIBITED SUBSTANCES

S1. Anabolic agents

1. Anabolic androgenic steroids, e.g. testosterone
2. Other anabolic agents, e.g. clenbuterol selective androgen receptor modulators

S2. Peptide hormones, growth factors and related substances

1. Erythropoiesis-stimulation agents, e.g. EPO
2. Chorionic gonadotrophin and luteinising hormone in males
3. Insulins
4. Corticotrophins
5. Growth hormone and growth factors, e.g. insulin-like growth factor (IGF-1), mechano growth factors (MGFs)
6. Platelet-derived preparations, e.g. platelet-rich plasma (intramuscular route)

S3. Beta-2 agonists, e.g. terbutaline*

S4. Hormone antagonists and modulators

1. Aromatase inhibitors
2. Selective oestrogen receptor modulators (SERMs), e.g. tamoxifen
3. Other anti-oestrogenic substances, e.g. clomiphene
4. Agents modifying myostatin function

S5. Diuretics and other masking agents

Masking agents, e.g. diuretics, probenecid, plasma expanders, IV albumin and others

Diuretics, e.g. acetazolamide, amiloride, furosemide and others

PROHIBITED METHODS

M1. Enhancement of oxygen transfer, e.g. blood doping or modified haemoglobin products

M2. Chemical and physical manipulation, e.g. tampering or IV infusions

M3. Gene doping, e.g. transfer of cells or genetic elements or agents that alter gene expression

This is not a complete list of substances. For a complete list please consult www.wada-ama.org

Table II. World Anti-Doping Code: The 2010 Prohibited List – Substances and methods prohibited in competition

In addition to the categories S1 to S5 and M1 to M3 the following categories are prohibited in competition:

S6. Stimulants

1. Non-specified stimulants, e.g. amphetamine, cocaine, etc.
2. Specified stimulants, e.g., adrenaline, ephedrine & pseudoephedrine, etc.

S7. Narcotics, e.g. morphine, pethidine, methadone, etc.

S8. Cannabinoids: natural or synthetic THC

S9. Glucocorticosteroids*

Alcohol and beta-blockers are prohibited in certain sports.

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and if there is no reasonable therapeutic alternative that could be used that is not on the prohibited list. It is important to note that the use of any substance on the prohibited list in an attempt to increase 'low-normal' levels of an endogenous hormone is not considered an acceptable therapeutic intervention. Further details regarding TUE applications including application forms can be downloaded from www.wada-ama.org.

Challenges for the team physician

Nutritional supplements

Many elite and indeed recreational football players will at some stage in their career want to take nutritional supplements.[5] There is a widely held belief fuelled by the sports nutrition industry that ingestion of dietary supplements is an essential prerequisite for optimal performance and rapid recovery from the rigours of competition and training. Indeed, many teams and individuals obtain substantial sponsorship from supplement companies. While there are good data to support the fact that training for and playing football, particularly at the elite level, can increase the physiological requirement for macro- and micronutrients, there is also good evidence that this need can be met by a tailored diet. This requires that the athlete has a carefully worked-out diet that has the correct balance of carbohydrates, proteins and macronutrients that are eaten at the correct time before or after training and competition.[6] Therefore, there should be emphasis on the education of coaches, parents and athletes, particularly young players, who should focus on establishing adequate eating habits rather than emphasise intake of dietary supplements.

This issue is compounded by the fact that many nutritional supplements may be deliberately tainted with banned substances that are not listed in the ingredients advertised on the label, or are contaminated with traces of banned substances from lack of sterilisation or sanitation between batch preparations and this could lead to an adverse analytical finding, e.g. for nandrolone.[7,8] Furthermore, supplements produced from plant extracts might contain banned substances, e.g. ephedrine and morphine. Elite players must expect to be tested for banned substances on a regular basis and have to accept the consequences of an adverse analytical finding, irrespective of whether there was intentional or unintentional ingestion of the banned substances.[7] Therefore, the risks and benefits of supplement ingestion need to be assessed by the players and their medical/nutritional advisers before they start using these supplements. More recently it has become common practice among elite athletes to request certification of batch purity and acceptance of liability from the nutritional supplement company in an attempt to decrease the risk of testing positive from contaminated supplements.

Traditional medicines

The team physician might encounter players who ingest traditional medicines or supplements. This might particularly be the case on the continents of Africa, Asia and South America.[9-11] While there is generally little known about these practices from a scientific perspective, it is evident that many football players are ingesting traditional substances that contain ingredients that are banned, e.g. cocaine; or subject to certain restrictions, e.g. alcohol and marijuana; or might have adverse effects on the player's health, e.g. liboga, bilibili or wie-wie.[9] Generally awareness of doping and anti-doping, and indeed health-related issues in general, might be low in some geographical areas and thus the role of the team physician with respect to player education and awareness cannot be over-emphasised.

Management of asthma and exercise induced bronchospasm (EIB) with beta-2 agonists

All beta-2 agonists (including both optical isomers where relevant) are prohibited (and thus require TUE) except salbutamol (maximum 1 600 µg inhalation over 24 hours) and salmeterol by inhalation, which require a declaration of use in accordance with the International Standard for TUEs. Despite a declaration of use, the presence of salbutamol in urine in excess of 1 000 ng/ml is presumed not to be an intended therapeutic use of the substance and will be considered as an adverse analytical finding unless the athlete proves, through a controlled pharmacokinetic study, that the abnormal result was the consequence of the use of a therapeutic dose (maximum 1 600 µg over 24 hours) of inhaled salbutamol. Other drugs and forms of treatment are subject to the process of applying for TUE.

Corticosteroids

Glucocorticoids are frequently used in the management of various conditions in all athletes including football players; indeed, their widespread use is the subject of much debate.[12] All glucocorticosteroids are prohibited in competition when administered by oral, intravenous, intramuscular or rectal routes. In accordance with the International Standard for TUEs, a declaration of use must be completed for glucocorticosteroids administered by intra-articular, peri-articular, peritendinous, epidural, intradermal and inhalation routes. However, topical preparations when used for auricular, buccal, dermatological (including iontophoresis/phonophoresis), gingival, nasal, ophthalmic and perianal disorders are not prohibited and require neither a TUE nor a declaration of use.

There is a widely held belief, fuelled by the sports nutrition industry, that ingestion of dietary supplements is an essential prerequisite for optimal performance and rapid recovery from the rigours of competition and training.

Platelet-rich plasma

Use of platelet-rich plasma (PRP) in the management of chronic soft-tissue injuries has gained popularity in recent times. Platelet-derived preparations including PRP or products derived from the process of 'blood spinning' are prohibited if administered by intramuscular route. Other routes of administration require a declaration of use in accordance with the International Standard for TUEs.

NSAIDs and local anaesthetic injections

Recent studies have shown that the most common medications ingested by football players around the time of competition are non-steroidal anti-inflammatory drugs (NSAIDs).[5] While these agents are not on the prohibited list, it remains questionable whether they have any therapeutic benefit. Indeed, overuse or abuse of NSAIDs might have detrimental effects on various organ systems or, alternatively, might be

used predominantly to mask pain. Thus it might be argued that this places the health of the athlete at risk. Future monitoring programmes and clinical guidelines need to be established to clarify the judicious use of these agents in the sport setting, so that education of both athletes and medical staff can be effective.

Conclusion and comment

Dope-free sport remains an important goal to ensure fair competition. Medical doctors in the service of athletes therefore play an important role to ensure that athletes are effectively treated, yet do not fall foul of anti-doping regulations. However, many members of the medical profession are still unaware of the current prohibited substances or the requirements and procedures for applying for a TUE.

Football, through FIFA's F-MARC programme, has managed to maintain an excellent record with respect to anti-doping and remains a leading sporting federation in the fight against doping. This has been achieved through a structured approach and use of a network of doping control physicians who have targeted the education of both athletes and colleagues as a priority in this endeavour.

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In a nutshell

- The physical and mental health of the athlete may be severely compromised by the use of banned substances.
- The practice of doping is thus considered unethical by most international sports federations, the International Olympic Committee (IOC) and the World Anti-Doping Agency (WADA).
- Sanctions are applied to athletes who transgress the rules as set out by WADA and adopted by the sports federations that are signatories to the World Anti-Doping Code.
- During major competitions (including the upcoming World Cup) urine samples are collected from two randomly selected players from each team after each match.
- The doping control officials may also request blood testing for certain analyses, including erythropoietin and other substances.
- In southern Africa, the laboratory in Bloemfontein is the WADA/IOC accredited laboratory and testing of samples will be conducted at this venue during the 2010 FIFA World Cup.
- Athletes who suffer from a medical condition, such as asthma, that requires the medical use of banned substances may apply for a therapeutic use exemption.
- Legal nutritional supplements may contain banned substances, and it is the athlete's and team physician's responsibility to ensure that these are not present before the supplements are used.
- Traditional medicines may also contain banned or harmful substances.